CLAIMS

1. A cellulose-containing fibrous material, wherein hydroxy groups were oxidized at the C(6) of glucose units of the cellulose into aldehyde and carboxy groups.

2. A cellulose-containing fibrous material according to claim 1, wherein the total content of aldehyde and carboxy groups is at least 50 μmol/g fibrous material (as a dry content based on DIN EN 20638).

3. A cellulose-containing fibrous material according to claim 1, wherein the surfaces of the fibrous material used for oxidation are activated.

4. A paper or nonwoven comprising said cellulose-containing fibrous material according to claim 1.

5. A paper or nonwoven according to claim 4, wherein said paper or nonwoven is a tissue paper.

6. A paper or nonwoven according to claim 3, wherein said paper or nonwoven exhibits a relative wet strength (rel. WS) of more than 10 % calculated as follows:

$$\text{rel. WS} = BS_{wet}/BS_{dry}$$

where BS_{wet} is the width-related breaking strength of the wet sample strip as measured according to DIN ISO 3781 and BS_{dry} is the width-related breaking strength of the dry sample strip as measured according to DIN EN ISO 1924-2.

7. A paper or nonwoven product comprising at least one ply of said paper or nonwoven according to claim 4.

8. A paper or nonwoven product according to claim 7, wherein said paper or nonwoven product is a tissue product.

9. A tissue product according to claim 7, said tissue product having the form of a cleaning wipe, sanitary product, paper handkerchief, household towel, towel, cloth for facial use, napkin/serviette, bed linen or a garment.

10. A method of producing said cellulose-containing fibrous material according to claim 1, comprising the step of:

oxidizing a cellulose-containing fibrous material using a nitroxy compound optionally in combination with a primary oxidizing agent.

11. A method according to claim 10, wherein the organic nitroxy compound is a sterically hindered, organic non-conjugated nitroxy compound.

12. A method according to claim 10, wherein said organic nitroxy compound is a 2,2,6,6-tetramethylpiperidinyl-1-oxyl (TEMPO) optionally substituted in 4 position.

13. A method according to claim 10, wherein said primary oxidizing agent is chosen from a hypohalite, ozone, a peracid, a metal-containing oxidizing agent and an oxidase.

14. A method according to claim 10, wherein peracid is used in the presence of a catalytic amount of halide at a pH of 5-11 for the purpose of oxidation.

15. A method according to claim 10, wherein oxidation is performed using hypohalite or ozone as a primary oxidizing agent and a 4-hydroxy, 4-amino or 4-amido substituted 2,2,6,6-tetramethylpiperidinyl-1-oxyl at a pH of 1-7.

16. A method according to claim 10, wherein oxidation is performed using MnO_2 as a primary oxidizing agent at a pH of 2-8.

17. A method according to claim 10, wherein oxidation is performed stoichiometrically using 4-acetamido-2,2,6,6-tetramethylpiperidinyl-1-oxyl (4-acetamido TEMPO) at an acidic pH (<7).

18. A method of producing a paper or nonwoven, comprising the steps of
wet laying said oxidized cellulose-containing fibrous material of claim 1,
pressing the wet-laid fibrous material, and
drying the pressed fibrous material.

19. A method according to claim 18, wherein said paper is a tissue paper, and said method comprises a pre-drying step based on TAD (through air drying) technology and is followed by a creping step.

20. A method according to claim 19, wherein said paper is a tissue paper, and said method comprises a wet rush transfer step prior to the drying step.

21. A method according to claim 18, wherein said obtained paper, tissue or nonwoven is further processed into a paper, tissue or nonwoven product using at least one process step chosen from: cutting to size, producing a plurality of plies, producing mechanical ply adhesion, volumetric and structural embossing, application of adhesive, folding, imprinting, perforating, application of lotions, calendering, stacking, rolling up.

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